How is realistic CGI used without it giving the uncanny valley feeling?

Abstract

The uncanny valley effect has been observed in the use of digital special effects and computer-generated imagery (CGI) in movies, particularly in the portrayal of humanlike characters. The more realistic these digital characters become the more unsettling or even repulsive to some viewers they come across. This is due to subtle differences between the digital character and a real human. The uncanny valley effect can impact the viewer's engagement with and enjoyment of the movie and may lead to a negative response to the character or the movie as a whole. Understanding and addressing this effect is important for filmmakers and special effects artists who are creating digital characters for movies, to ensure that they are perceived as believable and engaging by audiences. This paper investigates further how to use realistic CGI without the audience getting the eerie uncanny valley feeling.

Keywords

Uncanny valley, Paul Walker, Fast and the Furious, CGI, Motion Capture, discomfort, body double, The Polar Express.

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Introduction

CGI and motion capture has been used in different types of movies, such as science fiction movies or animated movies. These methods are used to create different types of characters and objects. CGI and motion capture has also been used in different movies that feature digital doubles of actors. Although this is where you have to be aware of the uncanny valley effect, filmmakers and special effects artists have to have a certain understanding and addressing of this uncanny valley effect. This is to create a realistic digital character without giving the audience an abnormal or unrealistic feel.

Literature review

There are multiple theories proposing an explanation for the uncanny valley effect. One states that a mismatch between the viewer's expectations and the actual appearance and behavior of the artificial entity. Yet other theories describe that the uncanny valley effect includes the idea that it is related to the human brain's ability to recognize and process facial expressions and other nonverbal cues, or that it is related to the human brain's aversion to stimuli that are perceived as being threatening or abnormal.

Uncanny Valley

The “uncanny valley” is a term used to describe the phenomenon whereby a human-like object or entity, such as a robot or a computer-generated avatar, becomes increasingly unsettling as it approaches a level of realism that is close to but not quite, human. This effect is thought to occur because the human brain is particularly sensitive to deviations (highly realistic faces with abnormal features as an example) from what it expects to see in terms of human appearance and behavior. When an entity looks and behaves almost, but not exactly, like a human, it can produce a sense of unease for some people. This can be especially pronounced when this entity has some human-like characteristics, such as facial expressions or movements, but then again these movements or facial expressions are not quite right or are a little exaggerated in some way.

CGI, or computer-generated imagery, refers to the use of motion graphics to create or enhance visual elements in movies, television shows, video games, and other media. As described in the text above is the uncanny valley a term used to describe the phenomenon of certain types of CGI appearing almost, but not quite, lifelike, resulting in a sense of discomfort or eeriness for the viewer. The uncanny valley was a concept introduced in 1970 by a Japanese roboticist named Masahiro Mori, he observed that as robots become more and more human-like in their appearance and behaviour, people’s emotional response to them becomes increasingly positive. However, at a certain point, as robots become almost, but not quite, indistinguishable from real humans, people’s emotional response becomes negative and they begin to feel discomfort.

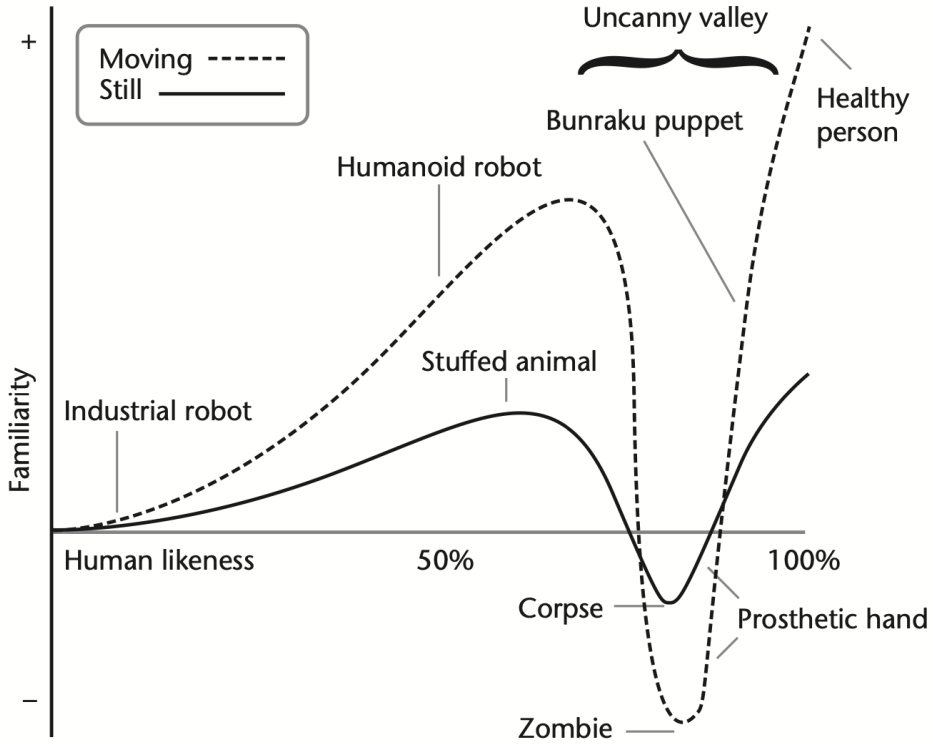

Figure 1.

‘Masahiro Mori’s graphical representation of the uncanny valley. The graph demonstrates a gap in familiarity as near-human likenesses approach realism.’

The same phenomenon can occur with CGI characters or other digital representations of humans. If the CGI is not realistic enough, it can be easily recognized as fake and not cause any issues. However, as the CGI becomes increasingly realistic, it may cross into the uncanny valley and cause a sense of discomfort to the viewer. Take as an example the animated movie 'The Polar Express', in this movie they use motion capture to get digital copies of the movements of the characters. After this movie came out they had many different reviews that go from 'creepy' to being praised. The 'creepy' reviews can be due to subtle discrepancies in the appearance or movements of the CGI characters that do not match those of real humans, causing them to appear "off" or not quite right.

- *''CNN reviewer Paul Clinton said, "[the] human characters in the film come across as downright ... well, creepy." On the other hand, Roger Ebert at the Chicago SunTimes praised the characters as having "a kind of simplified and underlined reality that makes them visually magnetic." ''* (Geller, 2008)

It is not uncommon for CGI to be used in movies however, whether or not a particular movie or scene is considered part of the uncanny valley would depend on the specific CGI used and the viewer's reaction to it.

Paul Walker

The creators of the Soprano Clan series, an American drama that aired from 1999 to 2007, had a bit of a problem after Nancy Marchand died during the show. As she was playing the mother of Tony Soprano and thus a lead role, it was difficult to come up with a reason for the disappearance of this character. After some deliberation, the crew of the show decided to keep the actor in the show. They used an understudy to play out as the mother and added an overlay of the face of the actress. Unfortunately, this did not work in the series as her facial expressions looked unnatural the ambitious idea ended up in it being an uncanny valley for a certain amount of the viewers.

After this incident, there were rarely any digital doubles made in the film industry. Yet this changed after the death of Paul Walker in 2013. Paul Walker was one of the main characters in many Fast and the Furious movies. After his sudden death in a real-life car accident. As the filmmaker's studio could not continue with Paul Walker being one of the main characters they decided to make him a digital double.

Even though the filmmakers of Fast and the Furious 7 faced the difficult task of completing the film without him. It was a very different case from the Soprano Clan series due to the big leap in the development of CGI. They used a combination of special effects, body doubles, and rewriting of the script to incorporate previously filmed footage of Paul Walker into the finished film. They also had the lucky opportunity to use his two brothers as understudies who look very much alike to Paul Walker.

As they did not want any mistakes they worked very hard to get the digital copy to look as close to real as possible. This included the use of motion capture technology to capture the movements of Paul Walker's body doubles (his brothers), which were then used to animate a digital version of Paul Walker's character in some scenes. The filmmakers also used CGI to combine shots of Paul Walker's face with shots of his body doubles to create the illusion that he was present in certain scenes. They made it as convincing as possible even though it was imperfect. The movie went down in the history books as the first film where they had a digitally made computer double working as a lead role.

- *‘Even a small mistake could cause the audience to feel like an "ominous valley", and they could not allow it.’* (Filatov, A., Kazyro, I. and Komissarova, D., 2022)

Even though some might say they find the certain CGI used in Fast and the Furious 7 to be realistic and not trigger the uncanny valley effect, some people may have found the resulting digital representation of Paul Walker’s character to be unsettling or unrealistic, and therefore have experienced the ‘uncanny valley’ effect. Ultimately, the uncanny valley experience is subjective and can vary from person to person.

Conclusion

Different types of filmmakers have used CGI to create an entity to play part in their films. As for entities, it can go from an unrealistic space being in Star Wars to it being a digital double by using motion capture on understudies. Even though a filmmaker's studio can try its very best in creating a believable image of a digital double. The uncanny valley effects can still depend on how the viewer experiences the animated character. Yet the filmmakers do have a certain amount of influence on it. As Fast and the Furious 7 had many advantages one of the biggest beings that they had the brothers as body doubles to complete the movie. For their face being much like that of Paul Walker.

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Image List

Figure 1: Geller, T. (2008). *IEEE Computer Graphics and Applications Overcoming the Uncanny Valley*. [online] Available at: http://people.cs.luc.edu/whonig/comp-388-488-robotics/course-materials/course-reading-materials/UncannyValleyGrapicsmcg2008040011.pdf [Accessed 5 Jan. 2023].